UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029

Inspection Report

MarkWest Liberty Bluestone L.L.C.
Sarsen Gas Processing Plant
Butler County, Pennsylvania

Inspection Date: July 25, 2012

This report contains Confidential Business Information (CBI)

Bruce Augustine
Engineer

9/26/2012
Date

Bowen (Chip) Hosford
Environmental Scientist

9-26-12
Date

SIC Code: 1311

PADEP
Plan
Approval: 10-359B

Attendees: USEPA
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David Ettore, MarkWest Environmental
Lisa Reaves, MarkWest Environmental
Tim Gatter, MarkWest Environmental
Josh Mozley, Operations Supervisor
Dale Starr, Plant Manager
Erik C. Schillo, Safety Compliance Coordinator

Kahuna Ventures LLC
Phil Ackerman

INSPECTION BACKGROUND

This inspection is part of the US Environmental Protection Agency's (EPA) national Energy Extraction Initiative. Through the Initiative EPA is ensuring that on-shore oil and natural gas facilities comply with permitting requirements and state and federal regulations. EPA's Region III Regional Office has conducted on-site inspections of natural gas wells, compressor stations, and plants over the past 12 months in Bradford, Tioga, and Washington Counties. This inspection and full compliance evaluation focused on the facility processing units to determine compliance with the PADEP PA and federal and state regulations.

The PADEP was notified of the inspection at least two weeks prior to the inspection.

FACILITY BACKGROUND

The Sarsen plant began operating on December 1, 2010.[1] The plant was operated by Keystone Midstream Services, LLC, a joint venture between Stonehenge Energy Resources, L.P. and R.E. Gas Development, LLC. Stonehenge served as Keystone's manager and was responsible for its operation and compliance with permit conditions. According to the PADEP PA (PA) Application for the facility, an existing Rex Energy Butler facility at the site was to be upgraded and a cryogenic gas processing facility installed. This combined facility became the Sarsen plant.[2]

PADEP issued PA 10-359A on August 17, 2010, for Keystone to build and operate the Sarsen plant. The initial 180 day shakedown period allowed under the PA was extended until May 24, 2012[3] and subsequently to July 31, 2012.[4] According to a June 13, 2012, letter, MarkWest, Liberty Bluestone LLC (MarkWest) purchased the Keystone assets on May 29, 2012. The assets included the Sarsen plant, the Bluestone gas processing plant, and the Voll compressor station. On June 26, 2012, MarkWest requested another extension of the PA because of its recent purchase of the Sarsen facility.[5]

OPENING MEETING:

The Sarsen plant inspection was one of three inspections EPA conducted the week of July 24 at MarkWest facilities; Sarsen, the Bluestone gas processing plant, and the Voll compressor station. Therefore, the opening meeting was held for all of these inspections on Tuesday morning at the Bluestone plant because it is the only one of the three facilities that had a meeting room.

We arrived at around 8:45 a.m. on Tuesday, July 24, 2012, and, after showing our credentials to the MarkWest personnel, discussed the inspections. Bruce Augustine described EPA Region III's participation in EPA's national Energy Extraction initiative and gave some general background on this initiative. He also stated that MarkWest may claim information gathered by EPA during the inspection to be Confidential Business Information (CBI). During the inspections MarkWest asked that photographs and videos EPA took during the inspection be identified as CBI. On July 31, 2012, MarkWest sent a letter to EPA claiming some documents provided to EPA during the inspection as CBI. Therefore, this report contains CBI.

Mr. Augustine stated that we wanted to discuss the plant processes and then walk

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[1] November 3, 2011 letter from Kahuna Ventures LLC to PADEP(see the 3 ring binder of documents provided at the inspection, Section 1)

[2] December 9, 2009, PA Application letter and application from SE Technologies (see 3 ring binder Section 1.

[3] November 10, 2011 letter from PADEP to Kahuna Ventures LLC(see the 3 ring binder of documents provided at the inspection, Section 1)

[4] January 18, 2012 letter from PADEP to Keystone Mistream Services LLC (see the 3 ring binder of documents provided at the inspection, Section 1)

[5] June 26, 2012 letter from MarkWest to PADEP (see the 3 ring binder of documents provided at the inspection, Section 1)

through the plant. He also pointed out that we would be carrying a Toxic Vapor Analyzer (TVA) and a FLIR Infrared Camera since Sarsen is subject to leak detection and repair requirements in its PA from 40 CFR Part 60, Subpart KKK.[6]

After a plant safety presentation by Mr. Schillo we discussed processes and emissions at the two gas processing plant and the compressor station. Some of the information discussed during that opening meeting is included in this report.

PLANT INSPECTION

On Wednesday, July 25, 2012, we met the MarkWest personnel at the Bluestone plant and then drove to the Sarsen plant, several miles away for the inspection. We arrived at 8:57 a.m., calibrated the TVA and warmed up the FLIR camera for the inspection. Then the group began its tour of the plant at the gas inlet side of the plant. Video and photograph logs are attached as Appendices 1 and 2 to this report.

Unless noted otherwise, information about plant operations and processes during the plant tour were provided by Mr. Ackerman. Mr. Ackerman has worked for Kahuna for approximately eight months; all of it at the Saresen, Bluestone, and Voll facilities.

During our inspection we walked through the station essentially following the gas flow from the inlet pipes until the gas exited the station. There are two low pressure lines and one high pressure line carrying field gas into the station:

[redacted]

The low pressure lines carry gas directly from the wells without any compression. Therefore, the pressure in this line is typically below [redacted] pounds per square inch (psi). The high pressure line carries gas from the Voll midstream compressor station. Based on our observations of the computer monitoring screens in the Sarsen control room, the low pressure lines were carrying [redacted] field, or raw gas, to the facility. The high pressure Voll line was providing [redacted] field gas to the Sarsen station; [redacted]. According to Mr. Wehldon, the Sarsen plant capacity is [redacted] MMscf. Mr. Wehldon also stated that some water and condensate is removed from the field gas at the well pads and at the Voll compressor station.

Generally the raw gas flows from the inlet pipes past slug catchers to the four inlet compressors. These compressors increase the pressure of the raw gas before it is sent to the molecular (mole) sieves to remove water and contaminants then to the triethylene glycol (TEG) contactor tower to remove additional water and contaminants. After dehydration, the gas goes through the cryogenic processes that separate the non gas liquids (NGLs) from the residue, or

[6] Standards of Performance for Equipment Leaks of VOCfrom Onshore Natural Gas Processing Plants.

sales, gas. These processes are the de-methanizer, de-ethanizer, and de-propanizer. The residue gas is compressed [redacted] in the outlet compressors and released to a [redacted] Transmission pipeline.

The NGLs are stored in [redacted] tanks; [redacted] propane and [redacted] y-grade liquids. The y-grade liquids are a mix of hydrocarbons such as butane and natural gasoline that are heavier than propane. The propane and y-grade liquids are trucked off site; the y-grade for further processing.

The TEG is not only used to remove liquids from the gas in the contactor tower but to regenerate the molecular sieves as well. The TEG reboiler heats rich TEG stream from the bottom of the contactor tower and the molecular sieve regeneration process to drive off the water and contaminants and releases them through a still vent. The dehydrated TEG is returned to the contactor tower and mole sieve regeneration. The still vent vapors are sent to a JATCO BTEX eliminator skid that separates the condensable and non-condensable vapors. Condensed liquids are sent to a tank and the non-condensable vapor is sent to a flare.

According to the PA, the Sarsen plant has the following emission generating equipment:

Equipment	Control	ID # in the Plan Approval
[redacted] inlet compressors	3 way catalyst (NSCR)	[redacted]
[redacted] "residue" compressors	3 way catalyst (NSCR)	[redacted]
[redacted] refrigerant compressors		[redacted]
Dehydrator/reboiler	JATCO BTEX Eliminator and flare	[redacted]
Emergency generator		[redacted]
[redacted] condensate (water) tanks	None	[redacted]

In the original PA application, vapors from the BTEX eliminator were supposed to be routed to the TEG reboiler.[7] However, according to Mr. Ackerman and the P&IDs, these vapors are actually routed to the flare. The PA Application states that the flare is not an emission source on its own and will be used to combust the gas from compressor blowdowns and condensate vapors from the facility tanks. The flare is not listed as an emission source in the PA and is not subject to any performance requirements.

Water and other liquids from all of the processes at the facility are sent to [redacted] atmospheric, [redacted] tanks, [redacted], that are emptied periodically by truck. The tanks have thief hatches with pressure relief valves.. According to Sarsen's piping and instrumentation diagrams (P&ID), the [redacted] tanks have common piping and receive liquids from the following sources at the facility:

- inlet slug catchers
- [redacted], 3 phase separator at the inlet gas side
- the inlet compressors
- the outlet, or residue gas, compressors
- the TEG reboiler

[7] December 9, 2009, PA Application, 1.0 Project Overview and Preliminary Flare Emissions Compilations

- [redacted], flare knockout
- [redacted] free water knockout at the glycol contactor
- [redacted] ethane fuel gas scrubber
- [redacted] coalescing filter for ethanizer bottoms reboiler

Each tank is equipped with an Enardo thief hatch. During the inspection we climbed the stairs on the outside of the tanks to the catwalk along one side of the tanks to observe these thief hatches. Using the FLIR camera I observed that both hatches were leaking from the gaskets and joints. I also visually observed liquid on the tank around the thief hatch and a deteriorated gasket on tank [redacted]. Concentrations of the emissions measured with the TVA were more than 10,000 ppm. These thief hatches are not subject to leak detection and repair (LDAR) standards.

Although the PA Application indicated that the tank emissions would be vented to the flare this system was not installed and the tanks are atmospheric with no emission controls. The PA contains an emission estimate of .56 tpy for each tank. Mr. Wehldon pointed out that because tank emissions were calculated to be less than 2 tpy, the facility is not required to control emissions under Pennsylvania regulations.

Each tank has a [redacted] heater to be used to prevent the tank contents from freezing in extreme cold.[8] I observed emissions from the tank heater stacks with the FLIR infrared camera that indicated that the heaters were on during the inspection.

We recorded the following data from the data screens at each engine and the pressure drop as measured by a MarkWest technician at the Sarsen plant:

[redacted]

[1] inlet compressors
[2] residue compressors

I took the following videos during the plant inspection. Mr. Wehldon stated that EPA should consider all of these videos Confidential Business Information (CBI).

FLIR Infrared Camera Log
All videos are Confidential Business Information

Video number	Description
[redacted]	[redacted]
[redacted]	[redacted]

[8] December 9, 2009, PA Application, 1.0 Project Overview.

[redacted]

LDAR OBSERVATIONS AND DATA REVIEW

During our walkthrough of the gas inlet area we observed a number of components that were not tagged for leak detection and repair (LDAR) as required by the PA despite being subject to these requirements. Mr. Wheldon pointed out that MarkWest is in the process of reviewing the LDAR program for Sarsen, including making sure that all components are tagged correctly. Mr. Ettore and I observed the following components in the inlet area that are potentially subject to LDAR and were not tagged. Therefore, they would not have been monitored for leaks.

[redacted]

I also observed a number of components tagged for LDAR monitoring in the outlet compressor building that are not subject to LDAR requirements. At all four engines, valves on the air supply, waste water drain, and oil supply lines were tagged for monitoring. None of these components are subject to LDAR monitoring because they do not carry materials defined in the regulation.

MarkWest provided LDAR files on a CD that were reviewed after the inspection. The following information is based on this review:

- LDAR monitoring at Sarsen was conducted on:
    - April 13, 2011
    - May 26, 2011
    - July 21, 2011
    - October 19, 2011
- There is no documentation of quarterly monitoring for the first two quarters of 2012.
- Kahuna submitted two semi-annual reports to PADEP;
    - The initial report dated May 27, 2010, for December 2010 through May 2011
    - October 27, 2011 for April through September 2010.
- Shaw provided the results of its October monitoring event to Keystone on November 18, 2011.
- Another semi-annual report was due for October 2011 through March 2012. There was no semi-annual report to PADEP in the documents provided by MarkWest.
- According to an email provided by MarkWest there was no monthly pump monitoring for July and August 2011.[9]

Emission tests for the inlet, residue, and refrigerant compressors were performed in March and April 2011 for initial testing as required by the PA. Subsequent annual testing, as required by the PA was conducted in March 2012.[10]

AREAS OF CONCERN

During the inspection and document review, I identified the following areas of concern:

LDAR

- MarkWest did not provide an LDAR semi-annual report for October 2011 through March 2012.
- Pumps were not monitored in July and August, 2011 as required by the PA.
- No records were provided for monitoring between October 19, 2011 and the inspection date; July 25, 2012. This is a gap of eight months or two quarters.
- Three pressure relief valves, 21 valves, two pig receiver doors, and two gauges were not tagged in the field gas inlet area.
- Nine valves were tagged for LDAR monitoring on air, waste water, and oil lines that are not subject to the LDAR program

BTEX Eliminator System

- During the inspection, we observed the BTEX Eliminator with the FLIR infrared camera and the TVA 1000.
- Leaks from inside the skid, observed with the FLIR camera, caused the TVA to flameout. Therefore, emissions exceeded 10,000 ppm.
- Emissions inside the skid were so substantial that components could not be monitored because the TVA would not stay lit inside the skid.

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[9] September 7, 2011, email from Gary Anderle, Shaw Environmental

[10] Source Emission Test Reports in 3 ring binder.

- All three pressure relief valves on the roof of the skid were popped open continuously during our time at this location; approximately 15 to 20 minutes. According to the P&IDs, two of the three pressure relief valves were set at [redacted] ounces and [redacted] pounds psig.
- Mr. Ackerman stated, and the P&ID drawings show, that the non-condensable vapors are routed to the flare.
- The December 9, 2009, PA application states the vapors will be routed to the reboiler.

Flare

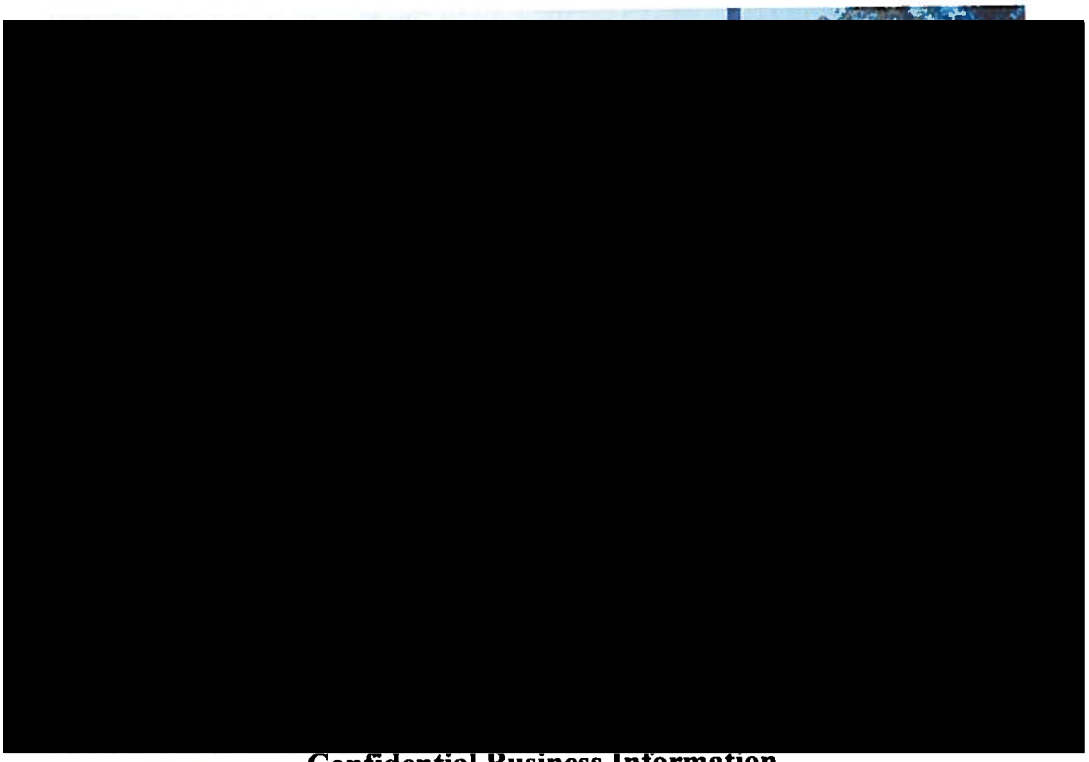
- The flare is not listed as an emission source in the PA, therefore, it is not required to meet any regulatory requirements.
- The 2009 PA Application states that the flare is not an emission source on its own, it will be used for maintenance blowdowns of the compressors and condensate overhead vapors.
- As noted in the BTEX section above, the P&IDs and the staff indicate that the BTEX non-condensable vapors are routed to the flare.

Storage Tanks

- [redacted] storage tanks had thief hatch assemblies that were leaking hydrocarbons from around the gaskets and hatches when observed with the FLIR camera.
- Emission concentrations from the hatches were more than 10,000 ppm measured with the TVA
- The gaskets were deteriorated.
- There were liquids around one of the thief hatches.

Photographs

All photographs were taken by Bruce Augustine the day of the inspection, July 25, 2012. Mr. Wehldon stated that EPA should consider these photographs Confidential Business Information (CBI).



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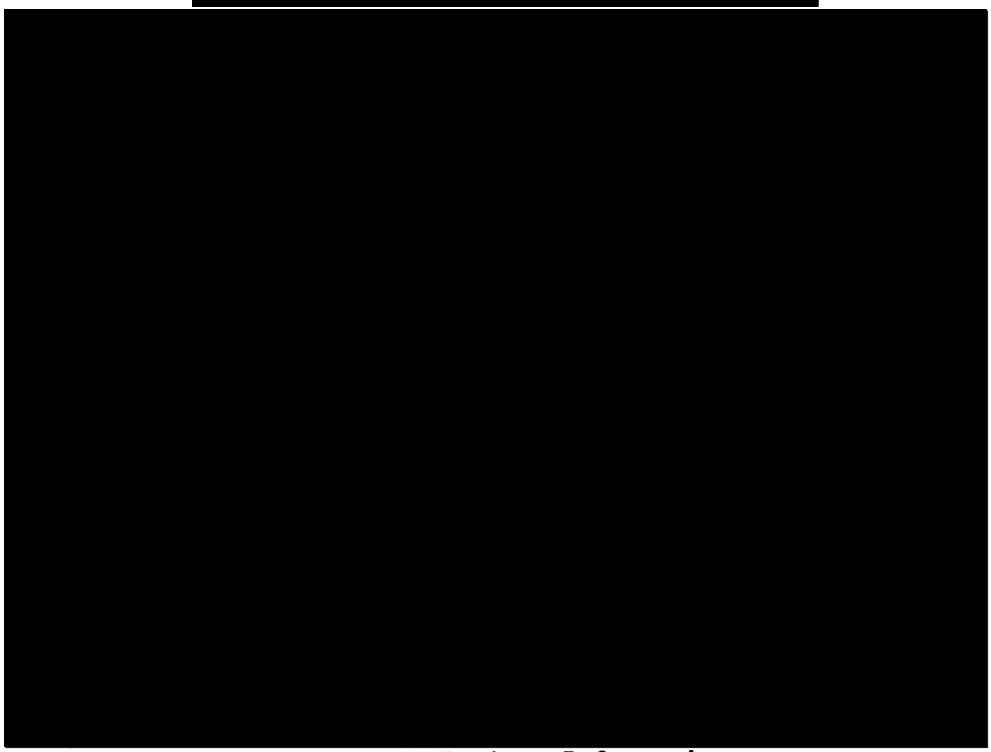

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